

3.6 Wetlands

3.6.1 Studies and Coordination

This section is based on the finding of the *SR 509/South Access Road EIS Discipline Report: Wetlands* (Wetland Discipline Report) (CH2M HILL August 2000b), *SR 509/South Access Road EIS: South Airport Link* (August 2001), and *SR 509/South Access Road EIS: I-5 Improvements Report* (CH2M HILL October 2001). These discipline reports contain detailed descriptions of methods, results of the field investigation, and an evaluation of the characteristics and functions of wetlands identified in the project area.

The identification of wetlands along the SR509: Corridor Completion/I-5/South Access Road Project is based on methods presented in the 1987 USACOE *Wetland Delineation Manual* (Manual) (USACOE 1987), and the 1997 *Washington State Wetland Identification and Delineation Manual* (WIDM) (Ecology 1997). Two levels of investigation were conducted for the evaluation of the wetlands within the project area: (1) a review and analysis of site-specific literature and data, and (2) site-specific field investigations to determine the presence and extent of wetlands. For this investigation, the wetlands within 100 feet of the proposed project alignments were identified. The methods used in the field investigation are described in the *SR 509/South Access Road EIS Discipline Report: Wetlands* (Wetland Discipline Report) (CH2M HILL August 2000b).

Existing information was reviewed to identify documented wetlands or site characteristics that would indicate wetlands within the project area. The following documents were reviewed to gather preliminary information about the vegetation, soils, and hydrology of the area:

- *National Wetland Inventory, Des Moines and Poverty Bay, Washington Quadrangles* (U.S. Fish and Wildlife Service [USFWS] 1987)
- *King County Sensitive Areas Map Folio* (King County 1990a)
- *King County Wetland Inventory* (King County 1990b)
- *Soil Survey of King County Area, Washington* (SCS 1973)
- Color aerial photographs, 1994 and 1997 (scale 1:24,000)
- *Wetland Delineation Report, Master Plan Update Improvements Seattle-Tacoma International Airport* (Parametrix 1999a)

- *Wetland Functional Assessment and Impact Analysis, Master Plan Update Improvements Seattle-Tacoma International Airport* (Parametrix 1999b)

Following the field investigations, these documents were reviewed again to determine the connection between wetlands and surface water features outside the project area.

Coordination was initiated with the following local agencies and groups of the NEPA/SEPA/Section 404 Merger SAC:

- Port of Seattle, Sea-Tac Airport
- King County, Department of Natural Resources
- City of Des Moines, Department of Community Development
- City of SeaTac, Department of Planning and Community Development

3.6.2 Affected Environment

The proposed project would extend south of Sea-Tac Airport from 12th Place South/South 188th Street and the airport south terminal drives in the City of SeaTac to as far south as South 310th Street in the City of Federal Way. Segments of the build alternatives would extend through the Des Moines Creek, Miller Creek, Lower Puget Sound, Lower Green River, and Mill Creek watersheds. The project area is characterized as urbanlands, residential, and open green space.

The project area is located on glacial highlands that drain to the Green River Valley and Puget Sound. Topography is gently undulating to hilly, with ravines along riparian corridors. Soils within a large portion of the project area consist of excessively drained to moderately well-drained soils that have developed in glacial outwash and till. In many areas, dense slightly permeable glacial till occurs at a depth of 20 to 40 inches. Soil map units in the project area are described in Section 3.4, *Geology and Soils*.

The build alternatives would cross Des Moines Creek. Des Moines Creek has been classified by King County as a Class 2 stream with salmonids (King County 1990a).

The build alternatives, including the I-5 improvements, directly affect 32 wetlands or wetland buffers (Table 3.6-1, Figures 3.6-1 through 3.6-4). Two wetlands (Wetlands A and 9) occur along the mainstem of Des Moines Creek. Three wetlands (Wetlands D, F, and G) have surface water connections to drainages that flow into Des Moines Creek. Twenty-one wetlands (Wetlands B, H, K, M, N, S, 1, 2, 5, 6, 7, 8, 15, 16, 17, 18, 19, 20, 21, 22, and 23) are isolated slope or depression systems. Two wetlands (Wetlands I-13 and I-19) are associated with McSorley Creek. One wetland (I-7) consists of cut-slope seeps within the Mill Creek watershed. Three

Table 3.6-1 Summary of Wetland Characteristics						
Wetland and Watershed	Size (acres)	USFWS Classification	Hydrologic Connection	Ecology Rating	Local Rating	Ecology Buffer Size (feet)*
Des Moines Creek Basin						
A	16.0	PFO/PSS	Riparian along Des Moines Creek	2	1 ^a	100
B	6.6	PFO/PSS/PEM	Depressional	2	1 ^a	100
D	4.9	PFO/PSS/PEM	Riparian, East Fork of Des Moines Creek	2	2 ^a	100
F	28.8	PFO/PSS/PEM/POW	Headwater of East Fork of Des Moines Creek	2	1 ^a	100
G	7.9	PSS/PEM	Riparian along Des Moines Creek	2	2 ^a	100
H	0.09	POW/PEM	Isolated Depression	4	3 ^a	25
K	0.09	PEM	Isolated Depression	3	3 ^a	50
M	0.1	PSS	Isolated Depression	3	3 ^a	50
N	0.1	PSS	Isolated Depression	3	3 ^a	50
S	0.5	PEM	Isolated Slope	4	3 ^a	25
1	0.02	PFO	Isolated Slope	3	3 ^a	50
2	0.7	PFO	Isolated Depression	3	3 ^a	50
5	0.9	PFO/PSS	Isolated Depression	3	3 ^a	50
6	0.03	PFO/PSS	Isolated Depression	3	3 ^a	50
7	0.6	PFO/PSS	Isolated Depression	3	3 ^a	50
8	0.08	PFO/PSS	Isolated Depression	3	3 ^a	50
9	0.07	PSS/Stream	Riparian along Des Moines Creek	2	SW ^b	100
15	0.2	PFO	Isolated Depression	3	3 ^a	50
16	0.04	PFO	Isolated Depression	3	3 ^a	50
17	0.06	PFO	Isolated Depression	3	3 ^a	50
18	0.9	PEM	Isolated Slope	4	3 ^a	25
19	0.5	PFO/PSS	Isolated Slope	3	3 ^a	50
20	0.3	PFO/PSS	Isolated Depression	4	3 ^a	25
21	0.2	PEM	Isolated Depression	3	IW ^b	50
22	0.01	Ditch	Isolated Depression	4	IW ^b	25
23	0.01	PEM	Isolated Slope	4	3 ^a	25
Mill Creek Watershed						
I-7	0.06	PEM	Cut slope discharge to I-5 drainage system	3	3 ^c	50
Lower Green River Watershed						
I-10	0.05	PEM/PSS	Isolated culvert connection with I-5 drainage system	3	3 ^c	50
I-11	0.2	PFO/PSS	Isolated culvert connection with I-5 drainage system	3	3 ^c	50
I-12	0.3	PEM/PSS	Isolated depression	3	3 ^c	50
Lower Puget Sound Watershed						
I-13	0.2	PFO	Riparian system along McSorley Creek or tributary	3	3 ^c	50
I-19	78.5	PFO	Riparian system along McSorley Creek or tributary	1	1 ^d	200

* Lower range of Ecology (1998) recommended buffer width

SW = significant wetland

IW = important wetland

PFO = palustrine forested

PSS = palustrine scrub-shrub

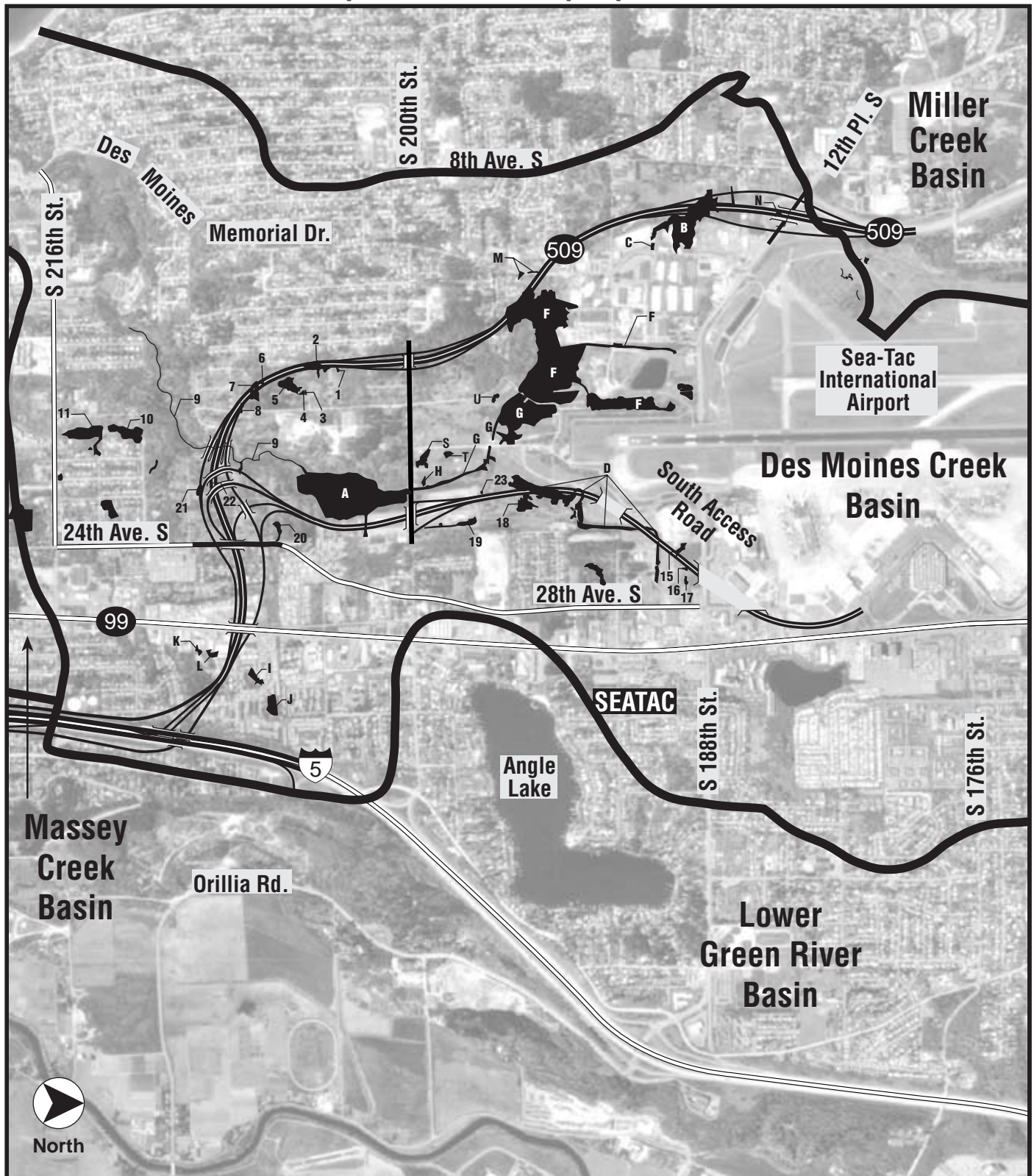
PEM = palustrine emergent

^a Using City of SeaTac Environmentally Sensitive Areas Ordinance (1994)

^b Using City of Des Moines Environmentally Sensitive Areas Ordinance (1997)

^c Using City of Federal Way Environmentally Sensitive Areas Ordinance Chapter 22.12 (2001)

^d Using City of Kent Wetlands Management Ordinance Chapter 11.04 (2000)



Legend

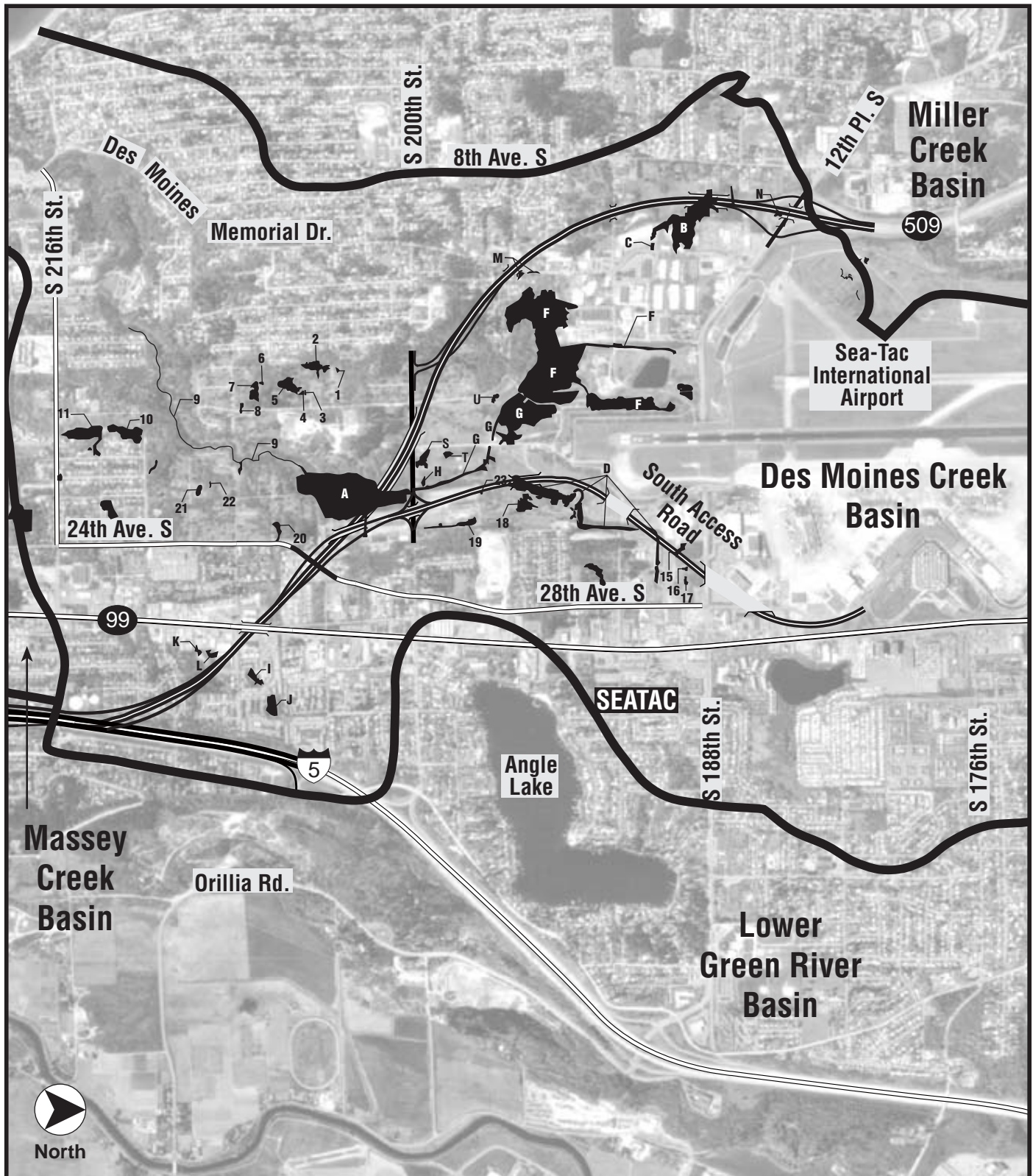
- SR 509/South Access Improvements
- Baseline Projects by Others
- Wetlands
- Basin Boundary

FIGURE 3.6-1

Wetlands Along Alternative B Alignment



SR 509: Corridor Completion/I-5/South Access Road
Environmental Impact Statement



0 1/4 1/2 3/4 1 MILES

Legend





-  SR 509/South Access Improvements
-  Baseline Projects by Others
-  Wetlands
-  Basin Boundary

FIGURE 3.6-2

**Wetlands Along Alternative C2 Alignment
(Preliminary Preferred)**



SR 509: Corridor Completion/I-5/South Access Road
Environmental Impact Statement

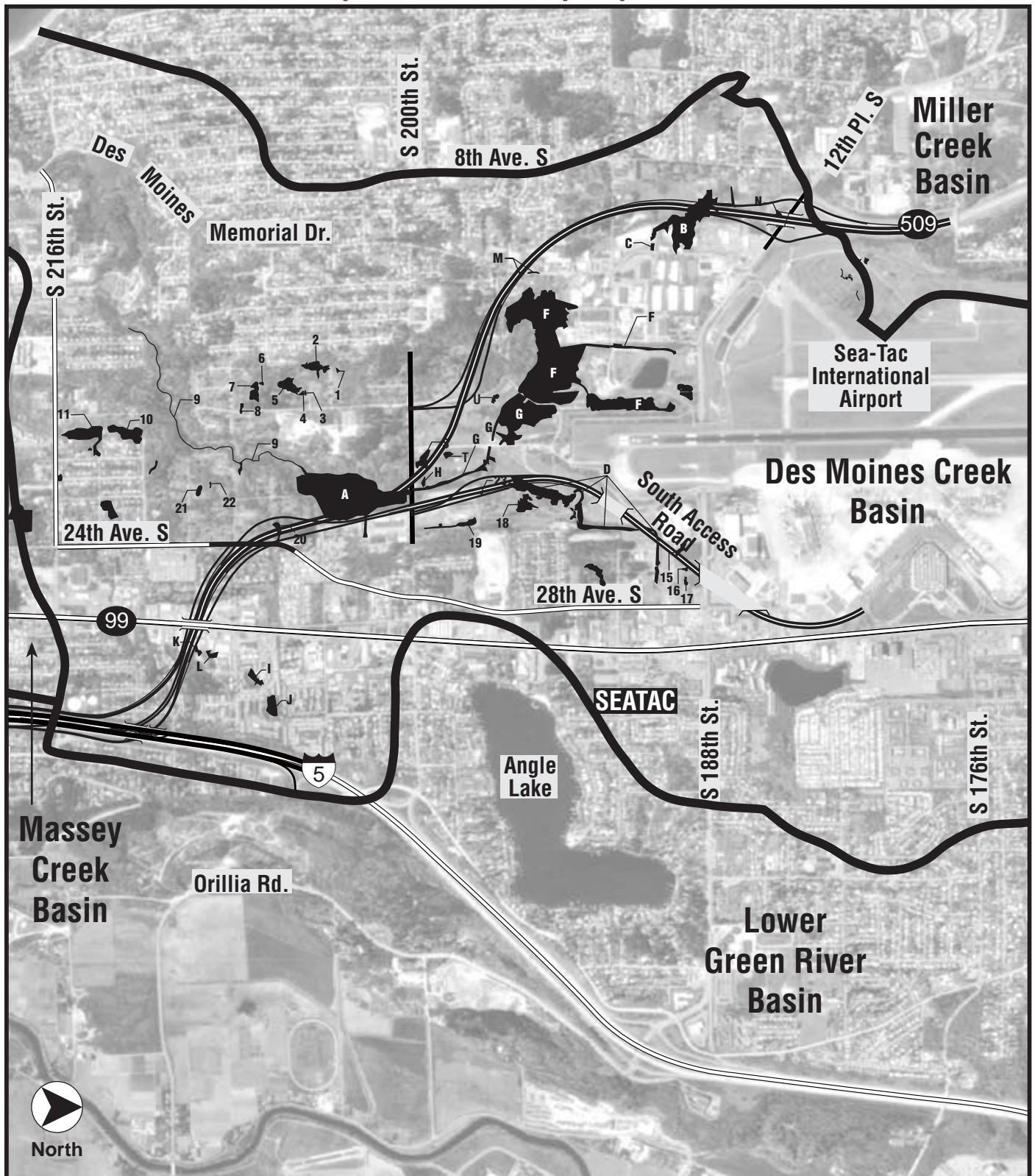



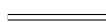


FIGURE 3.6-3

Wetlands Along Alternative C3 Alignment



SR 509: Corridor Completion/I-5/South Access Road
Environmental Impact Statement

Legend

-  SR 509/South Access Improvements
-  Baseline Projects by Others
-  Wetlands
-  Basin Boundary

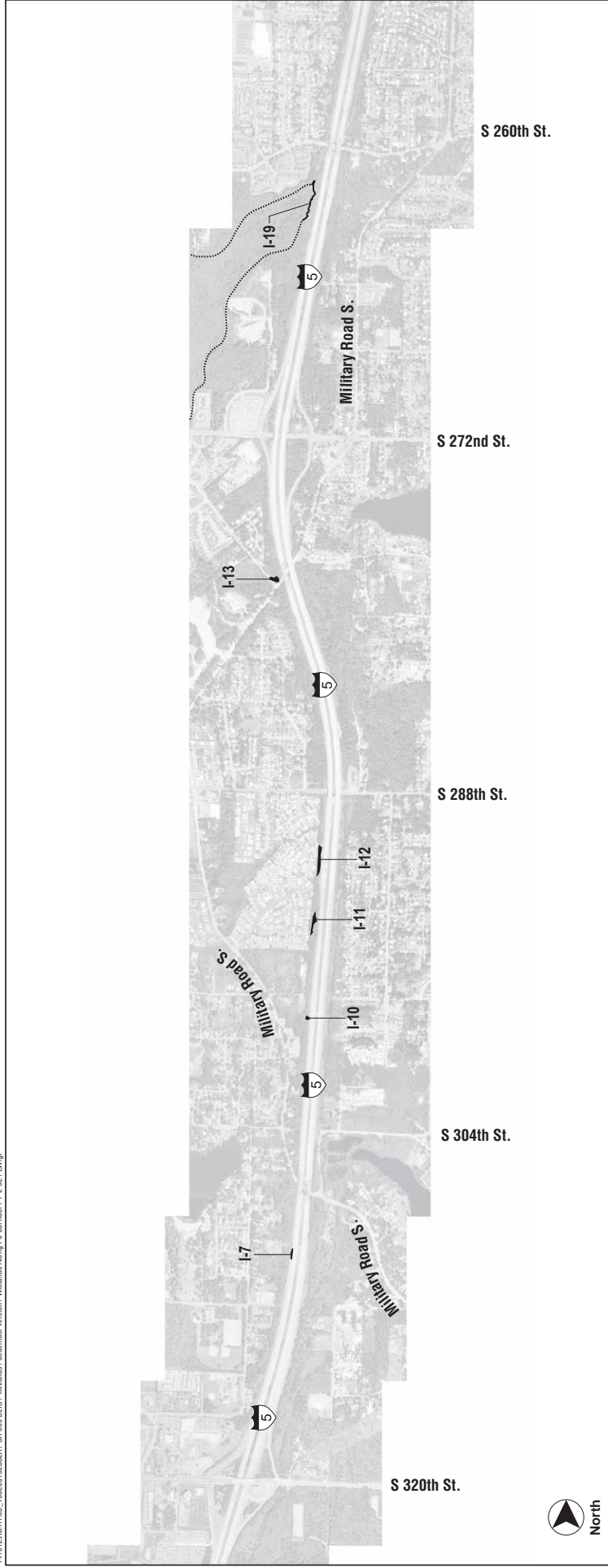


FIGURE 3.6-4

Wetlands Along I-5



SR 509: Corridor Completion/I-5/South Access Road
Environmental Impact Statement

Legend

Field Survey Boundary

Estimated Boundary

Reference: King County Wetland Inventory, 1990.

wetlands (Wetlands I-10, I-11, and I-12,) are isolated or culverted depression systems. No wetlands were identified along the South Airport Link segment of the build alternatives. Table 3.6-1 shows the wetland size; USFWS classification; hydrologic connection; classification in accordance with the Washington State Wetlands Rating System for Western Washington (Ecology 1993); City of SeaTac, City of Des Moines, City of Federal Way, or City of Kent Wetland Rating; buffer size; and primary wetland function(s). Common and scientific names for plant species observed in these wetlands are provided in Table 3.6-2. Table 3.6-3 provides a summary of generalized values for major wetland functions. The semi-quantitative method developed by Cooke (1997) was used to develop the qualitative assessment of wetland functions.

Wetlands were rated using the Washington State Wetlands Rating System for Western Washington (Ecology 1993) along with the City of SeaTac Environmentally Sensitive Areas Ordinance (1994), the City of Des Moines Environmentally Sensitive Areas Ordinance (1997), King County Environmentally Sensitive Areas Ordinance Chapter 21A.24 (2001), the City of Federal Way Environmentally Sensitive Areas Ordinance Chapter 22.12 (2001), and the City of Kent Wetlands Management Ordinance Chapter 11.04 (2000).

Information described for Wetlands 1, 2, 5, 6, 7, 8, 9, 15, 16, 17, 18, 19, 20, 21, 22, and 23 was obtained during a reconnaissance visit and/or the *Wetland Delineation Report for Master Plan Update Improvements, Seattle-Tacoma International Airport* (Parametrix 1999a).

Wetland A

Wetland A is a 16-acre Category 2 riparian wetland along Des Moines Creek (Ecology 1993). Only the portion of this wetland that could potentially be affected by the proposed alternatives was delineated. Wetland A extends south from South 200th Street along the Des Moines Creek corridor and connects to Wetland 9. Wetland A contains PFO and PSS habitat. Wetland vegetation is dominated by red alder, vine maple, Himalayan blackberry, salmonberry, wild lily-of-the-valley, and lady fern. Subdominant vegetation includes red elderberry, skunk cabbage, and slough sedge. Soils are black muck. The wetland hydrologic indicators are saturated soil and inundation. Soils not saturated or inundated were assumed to have wetland hydrology based on the presence of oxidized rhizospheres in the rooting zone, wetland drainage patterns, low soil chroma, and soil mottling.

Table 3.6-2
List of Observed Plant Species in Wetlands

Common Name	Scientific Name	Wetland Indicator Status ^a
Trees		
vine maple	<i>Acer circinatum</i>	FAC-
big-leaf maple	<i>Acer macrophyllum</i>	FACU
red alder	<i>Alnus rubra</i>	FAC
Oregon ash	<i>Fraxinus latifolia</i>	FACW
black cottonwood	<i>Populus balsamifera ssp. Trichocarpa</i>	FAC
Lombardy poplar	<i>Populus nigra</i>	NI
Quaking aspen	<i>Populus tremuloides</i>	FAC+
Douglas fir	<i>Pseudotsuga menziesii</i>	FACU
cascara	<i>Rhamnus purshiana</i>	FAC-
mountain ash	<i>Sorbus scopulina</i>	FACU
western red-cedar	<i>Thuja plicata</i>	FAC
Western hemlock	<i>Tsuga heterophylla</i>	FACU-
Shrubs		
redstem dogwood	<i>Cornus sericea</i> = <i>C. stolonifera</i>	FACW
Scotch broom	<i>Cytisus scoparius</i>	UPL
pacific crabapple	<i>Malus fusca</i>	FACW
Indian plum	<i>Oemleria cerasiformis</i>	FACU
Evergreen blackberry	<i>Rubus laciniatus</i>	FACU+
Himalayan blackberry	<i>Rubus procerus</i> = <i>R. discolor</i>	FACU
salmonberry	<i>Rubus spectabilis</i>	FAC+
Trailing blackberry	<i>Rubus ursinus</i>	FACU
willow	<i>Salix sp.</i>	NI
Pacific willow	<i>Salix lucida var. lasiandra</i>	FACW+
Scouler willow	<i>Salix scouleriana</i>	FAC
Sitka willow	<i>Salix sitchensis</i>	FACW
red elderberry	<i>Sambucus racemosa</i>	FACU
Douglas spirea	<i>Spiraea douglasii</i>	FACW
Grasses and Forbs		
colonial bentgrass	<i>Agrostis capillaris</i> = <i>A. tenuis</i>	FAC
redtop	<i>Agrostis gigantea</i> = <i>A. alba var. alba</i>	FAC
lady fern	<i>Athyrium filix-femina</i>	FAC
slough sedge	<i>Carex obnupta</i>	OBL
Canada thistle	<i>Cirsium arvense</i>	OBL
orchardgrass	<i>Dactylis glomerata</i>	FACU
Watson willowherb	<i>Epilobium ciliatum</i> = <i>E. watsonii</i>	FACW-
Fireweed	<i>Epilobium anagallidifolium</i>	FACU-

Table 3.6-2 (continued)
List of Observed Plant Species in Wetlands

Common Name	Scientific Name	Wetland Indicator Status^a
field horsetail	<i>Equisetum arvense</i>	FAC
giant horsetail	<i>Equisetum telmateia</i>	FACW
tall fescue	<i>Festuca arundinacea</i>	FAC-
bedstraw	<i>Galium sp.</i>	NI
Tall mannagrass	<i>Glyceria elata</i>	FACW+
common velvetgrass	<i>Holcus lanatus</i>	FAC
Creeping velvetgrass	<i>Holcus mollis</i>	FACU
Western St. John's wort	<i>Hypericum perforatum</i>	NI
tapertip rush	<i>Juncus acuminatus</i>	OBL
Daggerleaf rush	<i>Juncus ensifolius</i>	FACW
soft rush	<i>Juncus effusus</i>	FACW
duckweed	<i>Lemna minor</i>	OBL
birdsfoot trefoil	<i>Lotus corniculatus</i>	FAC
skunk cabbage	<i>Lysichiton americanum</i>	OBL
purple loosestrife	<i>Lythrum salicaria</i>	FACW+
wild lily-of-the-valley	<i>Maianthemum dilatatum</i>	FAC
Water parsley	<i>Oenanthe sarmentosa</i>	OBL
reed canarygrass	<i>Phalaris arundinacea</i>	FACW
waterpepper	<i>Polygonum hydropiper</i>	OBL
Japanese knotweed	<i>Polygonum cuspidatum</i>	FACU
Sword fern	<i>Polysticum munitum</i>	FACU
Bracken fern	<i>Pteridium aquilinum</i>	FACU
creeping buttercup	<i>Ranunculus repens</i>	FACW
true water cress	<i>Rorippa nasturtium-aquaticum</i>	OBL
curly dock	<i>Rumex crispus</i>	FAC+
small-fruited bulrush	<i>Scirpus microcarpus</i>	OBL
softstem bulrush	<i>Scirpus tabernaemontanii</i> = <i>S. validus</i>	OBL
bittersweet nightshade	<i>Solanum dulcamara</i>	FAC+
white clover	<i>Trifolium repens</i>	FAC
clover	<i>Trifolium sp.</i>	NI
common cattail	<i>Typha latifolia</i>	OBL
American brooklime	<i>Veronica americana</i>	OBL

^a Reed (1988, 1993) separates vascular plants into the following basic groups according to their "wetland indicator status" based on each species' frequency of occurrence in wetlands: Obligate wetland plants (OBL) occur almost always in wetlands (estimated probability >99%) under natural conditions. Facultative wetland plants (FACW) occur almost always in wetlands (estimated probability 67-99%), but occasionally are found in nonwetlands. Facultative plants (FAC) are equally likely to occur in wetlands or nonwetlands (estimated probability 34-66%). Facultative upland plants (FACU) usually occur in nonwetlands (estimated probability 67-99%), but occasionally are found in wetlands (estimated probability 1-33%). Obligate upland plants (UPL) occur almost always in nonwetlands under natural conditions (estimated probability >99%). No Indicator plants (NI) are not assigned an indicator status by Reed.

Table 3.6-3 Wetland Functions							
Wetland	Flood/ Stormwater Control	Base Flow/ Groundwater Support	Erosion/ Shoreline Protection	Water Quality Improvement	Natural Biological Support	Habitat Functions	Recreation
A	M	M	M/L	M	M	M	M
B	M	M	M/L	M	M	M/L	L
D	M/H	M/H	M/L	M	M	M	M
F	H	H	M	M/H	H	M/H	M
G	M	M	M	M	M/L	M/L	M/L
H	M	M	M/L	M/L	L	L	M/L
K	M/L	M/L	NA	M	L	L	L
M	M	M/L	NA	M/L	M/L	M/L	L
N	M	M/L	M/L	M	L	L	L
S	M/L	M/L	NA	M	L	L	M
1	M/L	M/L	NA	M	M/L	M/L	L
2	M/L	M/L	NA	M	M/L	M	L
5	M/L	M/L	NA	M	M/L	M	L
6	M/L	M/L	NA	M	M/L	M/L	L
7	M/L	M/L	NA	M	M/L	M/L	L
8	M/L	M/L	NA	M	M/L	M/L	L
9	M/L	M/L	M/L	M/L	M	M	M
15	M/L	L	NA	M	L	L	L
16	M/L	L	NA	M	L	L	L
17	M/L	L	NA	M	L	L	L
18	L	M/L	NA	M	L	L	M
19	L	M/L	NA	M	M/L	M/L	L
20	M/L	M/L	NA	M	M/L	M/L	L
21	M/L	M/L	NA	M	L	M/L	L
22	M/L	M/L	NA	M	L	M/L	L
23	L	M/L	NA	M	L	L	M/L
I-7	M/L	M	NA	M	M/L	L	L
I-10	M	M	NA	M/H	L	L	L
I-11	M	M	NA	M/H	M/L	M	L
I-12	M	M/L	NA	M/H	L	L	L
I-13	M	M	M	M/H	M	M/L	M/L
I-19	M	M	M	M/H	M	M/H	M/H

L = low

M/L = moderately low

M = moderate

M/H = moderately high

H = high

NA = Not Applicable

Wetland B

Wetland B is a 6.6-acre Category 2 wetland system in the northwest portion of the project area (Ecology 1993). Wetland B is west of Des Moines Memorial Drive, north of South 192nd Street, and south of the existing terminus of SR 509. It was not possible to determine the hydrologic connections for Wetland B because surface flow enters a culvert and discharges at an unknown location.

This wetland contains PFO, PSS, and PEM habitat. Wetland vegetation is dominated by red alder, Himalayan blackberry, and Scouler willow. Subdominant vegetation includes mountain ash, western red-cedar, Watson willowherb, American brooklime, orchardgrass, reed canarygrass, field horsetail, and giant horsetail. Soils are very dark brown sandy loam, dusky red loamy sand with strong brown mottles, and very dark gray sandy loam. The wetland hydrologic indicators are saturated soil and inundation, oxidized rhizospheres, wetland drainage patterns, low soil chroma, and soil mottling.

Wetland D

Wetland D is a 4.9-acre Category 2 wetland and stream system associated with the east fork (Tyee Fork) of Des Moines Creek (Ecology 1993). Wetland D extends northeast from the Tyee Valley Golf Course toward Bow Lake. The wetland/stream includes culvert crossings for both the golf course and airport parking. The southern portion of the wetland (2.9 acres) was modified in the late 1980s as a stormwater detention pond for the east fork of Des Moines Creek. At this time, the wetland is being considered a jurisdictional wetland. Outflow from the pond is diverted into a culvert to the south, which in turn discharges into the middle of Wetland G.

This wetland contains PFO, PSS, and PEM habitat and includes approximately 3,250 feet of the east fork of Des Moines Creek. Wetland vegetation is dominated by red alder, Sitka willow, birdsfoot trefoil, white clover, colonial bentgrass, tall fescue, soft rush, common velvetgrass, small-fruited bulrush, and true watercress. Subdominant vegetation includes Himalayan blackberry, bittersweet nightshade, curly dock, tapertip rush, softstem bulrush, and redtop. Soils include black muck, dark greenish gray sand, very dark brown sandy loam with dark yellowish brown mottles, and dark grayish brown loamy sand with dark yellowish brown mottles. The wetland hydrologic indicators are saturated soil and inundation. The hydrology in wetland areas was inferred based on wetland drainage patterns, drift lines, oxidized rhizospheres, low soil chroma, and soil mottling.

Wetland F

Wetland F is a 28.8-acre Category 2 wetland system associated with the western fork of Des Moines Creek (Ecology 1993). This wetland has been referred to as the “Northwest Ponds” and serves as a portion of the

headwaters of Des Moines Creek. Wetland F extends north from the Tyee Valley Golf Course and west toward Des Moines Memorial Drive. This wetland's outflow is connected to Wetland G through a 54-inch culvert.

This wetland contains PFO, PSS, PEM, and POW habitat. Forested areas are dominated by red alder and creeping buttercup. Scrub-shrub vegetation is dominated by Pacific willow, purple loosestrife, and waterpepper. Emergent areas are dominated by creeping buttercup, giant horsetail, bittersweet nightshade, and maintained golf course grass. Other subdominant vegetation includes Himalayan blackberry, soft rush, small-fruited bulrush, reed canarygrass, common cattail, Scouler willow, cascara, Indian plum, salmonberry, red elderberry, Douglas spirea, lady fern, and sword fern. Soils include black muck, peat, and organic loam. The wetland hydrologic indicators are saturated soil and inundation, wetland drainage patterns, and low soil chroma. A culvert that enters the wetland from the northwest contributes to wetland hydrology.

Wetland G

Wetland G is a 7.9-acre Category 2 wetland and stream system associated with Des Moines Creek (Ecology 1993). Wetland G extends south from the outflow of Wetland F to South 200th Street. This wetland/stream system has areas flowing through culverts.

This wetland contains PSS and PEM habitat and includes approximately 2,100 feet of Des Moines Creek. Wetland vegetation is dominated by Pacific willow and red alder in the scrub-shrub community. Wetland areas on the golf course fairways are dominated by mowed grasses. The delineation was based largely on hydric soil conditions. Soils include black muck. The wetland hydrologic indicators are saturated soil, inundation, oxidized rhizospheres, wetland drainage patterns, low soil chroma, and soil mottling.

Wetland H

Wetland H is a 0.09-acre Category 4 wetland that functions as a pond for the Tyee Valley Golf Course (Ecology 1993). Wetland H is just north of South 200th Street. It is adjacent to, but hydrologically isolated from, Des Moines Creek.

This wetland contains POW and a fringe of PEM habitat. Wetland vegetation is dominated by mowed grasses, soft rush, and reed canarygrass. Soils include black muck. The wetland hydrologic indicators are saturated soil and inundation.

Wetland K

Wetland K is a 0.09-acre Category 3 wetland (Ecology 1993) located south of South 208th Street, adjacent to Wetland L, and near a sanitary sewer lift

station. It was not possible to determine the hydrologic connections for Wetland K. The wetland is isolated by fill, and all inflows and outflows are in culverts. It is likely connected to Des Moines Creek through the area's stormwater system. A chainlink fence around the wetland minimizes human intrusions.

The wetland contains PEM habitat. Wetland vegetation is dominated by colonial bentgrass and reed canarygrass. Subdominant vegetation includes black cottonwood and creeping buttercup. Soils include very dark grayish brown sandy loam with yellowish brown mottles. The wetland hydrologic indicators are saturated soil, inundation, and wetland drainage patterns.

Wetland M

Wetland M is a 0.1-acre Category 3 wetland (Ecology 1993) located north of South 192nd Street and west of Des Moines Memorial Drive. The wetland is mostly a section of an old ditch. The southern end was filled sometime in the past, and the northern end enters a culvert crossing under South 192nd Street. It was not possible to determine the hydrologic connections for Wetland M. It is likely connected to Wetland F and Des Moines Creek through the area's stormwater system.

The wetland contains PSS habitat. Wetland vegetation is dominated by Scouler willow, red alder, and creeping buttercup. Subdominant vegetation includes Himalayan blackberry, giant horsetail, and Japanese knotweed. Soils include black sandy muck. The wetland hydrologic indicators are saturated soil and inundation, wetland drainage patterns, and low soil chroma.

Wetland N

Wetland N is a 0.1-acre Category 3 wetland (Ecology 1993) located within the half cloverleaf at the terminus of SR 509 at South 188th Street. The wetland is a depression and ditch surrounded by roads, and it flows into the roadway drainage system to the south. It was not possible to determine the hydrologic connections for Wetland N. It is likely connected to Wetland F and Des Moines Creek through the area's stormwater system.

Wetland N contains PSS habitat. Wetland vegetation is dominated by red alder, Douglas spirea, and grasses. Subdominant vegetation includes soft rush and pacific crabapple. Soils include gray loamy sand. The wetland hydrologic indicators are saturated soil and inundation, surface-scoured areas, wetland drainage patterns, and low soil chroma.

Wetland S

Wetland S is a 0.5-acre Category 4 wetland (Ecology 1993) located west of Des Moines Creek and north of South 200th Street within the Tyee Valley Golf Course. It is immediately west of Wetland H. The wetland is a seep on a

gentle slope. The water from this wetland appears to enter the golf course drainage system. The wetland contains PEM habitat. Wetland vegetation is dominated by grasses planted for the golf course fairways. Soils include very dark gray gravelly sandy loam. The wetland hydrologic indicator is saturated soil.

Wetland 1

Wetland 1 is a 0.02-acre Category 3 wetland system (Ecology 1993) in the western portion of the project area. Wetland 1 is west of 18th Avenue South and south of South 200th Street. This wetland contains PFO habitat with a shrub understory. Wetland vegetation is dominated by red alder, Himalayan blackberry, salmonberry, and giant horsetail. Hydric soils and wetland hydrology have been identified within the delineated wetland boundary.

Wetland 2

Wetland 2 is a 0.7-acre Category 3 wetland system (Ecology 1993) in the western portion of the project area. Wetland 2 is west of 18th Avenue South, south of South 200th Street, and south of Wetland 1. This wetland contains PFO habitat and a shrub understory. Wetland vegetation is dominated by red alder, black cottonwood, willows, redstem dogwood, Himalayan blackberry, lady fern, and reed canarygrass. Soils consist of black loam over very dark gray gravelly sandy loam. Saturation and inundation have been observed during the growing season. The western boundary of the wetland is a seep zone, and water generally flows to a depression. An intermittent swale extends out of the wetland to the southeast.

Wetland 5

Wetland 5 is a 0.9-acre Category 3 wetland system (Ecology 1993) in the western portion of the project area. Wetland 5 is west of 18th Avenue South and south of South 200th Street. This wetland contains PFO habitat and a PSS understory. Wetland vegetation includes western red-cedar, red alder, willows, Douglas spirea, creeping buttercup, and bittersweet nightshade. Soils consist of black peaty muck over gray loam. Standing water has been observed on the site.

Wetland 6

Wetland 6 is a 0.03-acre Category 3 wetland system (Ecology 1993) in the western portion of the project area. Wetland 6 is west of 18th Avenue South, south of South 200th Street, and south of Wetland 5. This wetland contains PSS and PFO habitat. Wetland vegetation is dominated by red alder, Himalayan blackberry, salmonberry, and Douglas spirea. Hydric soils and wetland hydrology have been identified within the delineated wetland boundary.

Wetland 7

Wetland 7 is a 0.5-acre Category 3 wetland system (Ecology 1993) in the western portion of the project area. Wetland 7 is west of 18th Avenue South, south of South 200th Street, and south of Wetland 6. This wetland contains PSS and PFO habitat. Wetland vegetation is dominated by red alder over Himalayan blackberry. Hydric soils and wetland hydrology have been identified within the delineated wetland boundary.

Wetland 8

Wetland 8 is a 0.08-acre Category 3 wetland system (Ecology 1993) in the western portion of the project area. Wetland 8 is west of 18th Avenue South, south of South 200th Street, and south of Wetland 7. This wetland contains PSS habitat with overhanging forest trees (PFO). Wetland vegetation is dominated by red alder, Oregon ash, willows, creeping buttercup, and bedstraw. Hydric soils and wetland hydrology have been identified within the delineated wetland boundary.

Wetland 9

Wetland 9 is an 0.07-acre Category 2 wetland around Des Moines Creek (Ecology 1993). Wetland 9 is downstream from Wetland A and includes the Des Moines Creek channel and associated riparian wetlands. The PSS habitat is dominated by red alder, vine maple, Himalayan blackberry, and salmonberry.

Wetland 15

Wetland 15 is a 0.2-acre Category 3 wetland (Ecology 1993) located south of South 188th Street and west of 28th Avenue South. The wetland is separated from a roadside ditch by a berm. No outlets or surface water inflows are identified for this wetland. The wetland contains PFO habitat. Wetland vegetation is dominated by black cottonwood, Scouler's willow, and red alder saplings. Soils include black gravelly sandy loam over gray gravelly sandy loam. The wetland hydrologic indicators are saturated soil and surface water inundation.

Wetland 16

Wetland 16 is a 0.04-acre Category 3 wetland (Ecology 1993) located south of South 188th Street and west of 28th Avenue South. The wetland is highly disturbed and might have been created through past land use. No outlets or surface water inflows were identified for this wetland. The wetland contains PFO habitat. Wetland vegetation is dominated by black cottonwood, red alder, and Himalayan blackberry. Soils include black gravelly sandy loam over gray gravelly sandy loam. The wetland hydrologic indicators are saturated soil and surface water inundation.

Wetland 17

Wetland 17 is a 0.06-acre Category 3 wetland (Ecology 1993) located south of South 188th Street and west of 28th Avenue South. The wetland is highly disturbed and might have been created through past land use. No outlets or surface water inflows were identified for this wetland. The wetland contains PFO habitat. Wetland vegetation is dominated by black cottonwood, red alder, and Himalayan blackberry. Soils include black gravelly sandy loam over gray gravelly sandy loam. The wetland hydrologic indicators are saturated soil and surface water inundation.

Wetland 18

Wetland 18 is a 0.9-acre Category 4 wetland (Ecology 1993) located east of Wetland D (Tyee Pond) within the Tyee Valley Golf Course. The wetland is a large seep area on a slope. Surface water from this wetland does not connect with Wetland D. The wetland contains PEM habitat. Wetland vegetation is dominated by grasses planted for the golf course fairways. Soils include very dark gray to gray gravelly sandy loam with mottling. The wetland hydrologic indicator is saturated soil.

Wetland 19

Wetland 19 is a 0.5-acre Category 3 wetland (Ecology 1993) located north of South 200th Street and east of Des Moines Creek. The wetland occurs on a slope and includes a ditch. The water from this wetland flows into the drainage system at 200th Street. The wetland contains PFO and PSS habitat. Wetland vegetation is dominated by salmonberry. Soils include black mucky loam. The wetland hydrologic indicators are saturated soil, watermarks, and wetland drainage patterns.

Wetland 20

Wetland 20 is a 0.3-acre Category 4 wetland (Ecology 1993) located between 24th Avenue South and Des Moines Creek near South 208th Street. The wetland is a small depression and receives runoff from development to the east. The wetland contains PFO and PSS habitat. Wetland vegetation is dominated by red alder, black cottonwood, salmonberry, Himalayan blackberry, and Douglas spirea. Soils include very dark gray clay loam under a deep organic surface layer. The wetland hydrologic indicators are saturated soil, water-stained leaves, watermarks, and wetland drainage patterns.

Wetland 21

Wetland 21 is a 0.2-acre Category 3 wetland (Ecology 1993) located between Des Moines Creek and 24th Avenue South and south of Wetland A. The wetland is a previously farmed area. It was not possible to determine the hydrologic connections for Wetland 21. The wetland contains PEM habitat.

Wetland vegetation is dominated by reed canarygrass. Soils include reddish gray gravelly sandy loam with mottles. The wetland hydrologic indicators are inundation, saturated soil, watermarks, and wetland drainage patterns.

Wetland 22

Wetland 22 is a 0.01-acre Category 4 wetland located near Wetland 21 (Ecology 1993). The wetland contains PEM habitat. Wetland vegetation is dominated by reed canarygrass. Hydric soil conditions and wetland hydrologic characteristics were observed in the wetland.

Wetland 23

Wetland 23 is a 0.01-acre Category 4 wetland (Ecology 1993) located east of Wetland G and south of Wetland D (Tyee Pond) within the Tyee Valley Golf Course. The wetland is a small seep area on a slope. The water from this wetland does not connect with other wetlands. The wetland contains PEM habitat. Wetland vegetation is dominated by grasses planted for the golf course fairways. Soils include very dark gray to gray gravelly sandy loam with mottling. The wetland hydrologic indicator is saturated soil.

Wetland I-7

Wetland I-7 is a 0.06-acre Category 3 cut-slope seep wetland along the I-5 roadcut (Ecology 1993). This wetland is located along the western side of I-5, north of South 310th Street. The water from this wetland enters a ditch that empties into the I-5 stormwater drainage system. A previously surveyed wetland delineation for Wetland I-7 (WSDOT 1997) represents the conditions observed during the 2001 field investigation.

This PEM wetland is in the Mill Creek watershed. Wetland vegetation is dominated by soft rush, colonial bentgrass, redtop, creeping velvetgrass, and field horsetail. Subdominant vegetation includes trailing blackberry, tapertip rush, daggerleaf rush, and reed canarygrass. Soils include grayish brown to very dark grayish brown gravelly loam surface soil over a greenish gray and black sandy loam. The wetland hydrologic indicators are saturated soil and wetland drainage patterns.

Wetland I-10

Wetland I-10 is a 0.05-acre Category 3 (Ecology 1993) depression located between I-5 and Military Road north of South 304th Street and south of South 288th Street. There is a culvert in the western portion of the wetland that extends to the east. A previous surveyed wetland delineation for Wetland I-10 represents the conditions observed during the 2001 field investigation.

This wetland is located in the Lower Green River watershed, and contains a PEM and a PSS portion. The vegetation is dominated by salmonberry,

Scouler willow, and reed canarygrass. Subdominant vegetation includes evergreen blackberry. Soils are very dark gray to dark brown sandy and gravelly loam. The wetland hydrologic indicators are saturated soil, wetland drainage patterns, and low soil chroma.

Wetland I-11

Wetland I-11 is a 0.2-acre Category 3 (Ecology 1993) depression located between I-5 and Military Road north of South 304th Street and south of South 288th Street. There is a culvert in the western portion of the wetland that extends to the east. The entire wetland was delineated in the field.

This PFO and PSS wetland is located in the Lower Green River watershed. Wetland vegetation is dominated by quaking aspen, Douglas spirea, slough sedge, and tall mannagrass. Subdominant vegetation includes Himalaya blackberry, Pacific willow, and Scouler willow. Soils are black organic loam. The wetland hydrologic indicators are saturated soil and wetland drainage patterns.

Wetland I-12

Wetland I-12 is a 0.3-acre Category 3 (Ecology 1993) isolated depression located between I-5 and Military Road, north of South 304th Street and south of South 288th Street. No outflow channel or culverts were observed during the field visit. The entire wetland was delineated in the field.

The wetland contains PEM and PSS habitats and is located in the Lower Green River watershed. Wetland vegetation is dominated by Douglas spirea and reed canarygrass. Subdominant vegetation includes trailing blackberry and bracken fern. Soils are black to very dark grayish brown loam with areas of peat. The wetland hydrologic indicators are wetland drainage patterns, low soil chroma, organic soils, and depressional topography.

Wetland I-13

Wetland I-13 is a 0.2-acre Category 3 (Ecology 1993) wetland associated with the headwaters of McSorley Creek and is located between I-5 and Star Lake Road north of Military Road. A culvert discharges into the eastern end of the wetland, and surface water flows to the west. Only a portion of the wetland was delineated in the field.

Wetland I-13 contains PFO habitat and is located in the Lower Puget Sound watershed. Wetland vegetation is dominated by red alder, black cottonwood, Himalaya blackberry, Douglas spirea, and redtop. Subdominant vegetation includes Pacific willow and giant horsetail. Soils are dark gray loam. The wetland hydrologic indicators are saturated soil, low soil chroma, and depressional topography.

Wetland I-19

Wetland I-19 is a 78.5-acre Category 1 (Ecology 1993) wetland associated with McSorley Creek located west of I-5 and south of South 159th Street. Surface water flows to the southwest. The eastern portion of the wetland was flagged in the field.

The wetland is a PFO system in the Lower Puget Sound watershed. Wetland vegetation is dominated by red alder, salmonberry, lady fern, and field horsetail. Subdominant vegetation includes western red-cedar and water parsley. Soils include black organic loams over greenish gray sandy gravelly loam and peat. The wetland hydrologic indicators are inundation, saturated soil, water-stained leaves, and wetland drainage patterns.

3.6.3 Environmental Impacts

This section describes potential long-term environmental impacts on wetlands and wetland buffers from construction and operation of the SR 509: Corridor Completion/I-5/South Access Road Project. Permanent construction impacts are direct effects on wetlands through filling, dredging, or altering hydrology. Operation impacts are impacts resulting from the ongoing use of the roadway after construction.

Alternative A (No Action)

With this alternative, no direct impacts on wetlands would occur as a result of construction.

Impacts Common to All Build Alternatives

The primary direct effect from project construction would be the permanent fill or dredge (from cut and fill slopes) of wetlands and their buffer areas. Some wetlands would be cleared, graded, and filled, while in other cases wetland buffers would be affected. Table 3.6-4 lists wetland impacts and wetland buffer impacts.

Wetland functions that would be reduced as a result of construction include flood water detention and retention, flood flow desynchronization, groundwater recharge and discharge, and water quality improvement. Vegetated wetland and adjacent upland areas that currently allow infiltration of rainwater would be replaced by impervious road surfaces. Biological and wildlife support would be affected by reduced production and disruption of connections among habitats (Table 3.6-3). Placement and sizing of culverts, bridges, berms, and other structures that direct the flow of surface water could alter wetland hydrology by diverting, restricting, or increasing the flow

Table 3.6-4 Summary of Potential Direct Impacts from Build Alternatives									
				Potential Direct Impact (acres)					
Wetland and Watershed	USFWS Classification	Wetland Rating*	Size (acres)	Wetlands			Buffers		
				Alternative B	Alternative C2 (Preliminary Preferred)	Alternative C3	Alternative B	Alternative C2 (Preliminary Preferred)	Alternative C3
Des Moines Creek Basin									
A	PFO/PSS	2/1 ^a	16.0	0.04	0.01	0.01	1.2	2.4	5.1
B	PFO/PSS/PEM	2/1 ^a	6.6	2.9	0.01	2.7	4.0	3.7	1.9
D	PFO/PSS/PEM	2/2 ^a	4.9	1.5	0	1.5	5.7	3.9	8.1
F	PFO/PSS/PEM/POW	2/1 ^a	28.8	1.5	0	0	2.5	0.5	0.4
G	PSS/PEM	2/2 ^a	7.9	0	0	0.08	0	0.1	0.7
H	POW/PEM	4/3 ^a	0.09	0	0	0.09	0	0	0.2
K	PEM	3/3 ^a	0.09	0	0	0.01	0	0	0
M	PSS	3/3 ^a	0.1	0	0.03	0.1	0.04	0.9	1.2
N	PSS	3/3 ^a	0.1	0.1	0.1	0.1	0.6	0.6	0.6
S	PEM	4/3 ^a	0.5	0	0	0.5	0	0	0
1	PFO	3/3 ^a	0.02	0.02	0	0	0.4	0	0
2	PFO	3/3 ^a	0.7	0.7	0	0	1.5	0	0
5	PFO/PSS	3/3 ^a	0.9	0	0	0	0.5	0	0
6	PFO/PSS	3/3 ^a	0.03	0.01	0	0	0.4	0	0
7	PFO/PSS	3/3 ^a	0.5	0.5	0	0	0.7	0	0
8	PFO/PSS	3/3 ^a	0.08	0.07	0	0	0.5	0	0
9	PSS, Stream	2/SW ^b	0.07	0.04	0	0	0.1	0	0
15	PFO	3/3 ^a	0.2	0	0	0	0.2	0	0.3
16	PFO	3/3 ^a	0.04	0.04	0.04	0.04	0.5	0	0.5
17	PFO	3/3 ^a	0.06	0	0	0	0.3	0	0.4
18	PEM	4/3 ^a	0.9	0.08	0	0	0.3	0	0
19	PFO/PSS	3/3 ^a	0.5	0	0	0	1.2	0	0
20	PFO/PSS	4/3 ^a	0.3	0	0	0.3	0	0	0.5
21	PEM	3/IW ^b	0.2	0.2	0	0	0.6	0	0
22	Ditch	4/IW ^b	0.01	0.01	0	0	0.4	0	0
23	PEM	4/3 ^a	0.01	0	0.01	0.01	0.05	0.1	0.1

Table 3.6-4 Summary of Potential Direct Impacts from Build Alternatives									
Wetland and Watershed	USFWS Classification	Wetland Rating*	Size (acres)	Potential Direct Impact (acres)					
				Wetlands			Buffers		
				Alternative B	Alternative C2 (Preliminary Preferred)	Alternative C3	Alternative B	Alternative C2 (Preliminary Preferred)	Alternative C3
Basin Total			69.6	7.7	0.2	5.4	21.6	12.3	19.9
Mill Creek Watershed									
I-7 PEM		3/3 ^c	0.06	0	0	0	0.05	0.05	0.05
Lower Green River Watershed									
I-10 PEM/PSS		3/3 ^c	0.05	0	0	0	0.03	0.03	0.03
I-11 PFO/PSS		3/3 ^c	0.2	0	0	0	0.04	0.04	0.04
I-12 PEM/PSS		3/3 ^c	0.3	0	0	0	0.1	0.1	0.1
Basin Total			0.5	0	0	0	0.2	0.2	0.2
Lower Puget Sound Watershed									
I-13 PFO		3/3 ^c	0.2	0	0	0	0.06	0.06	0.06
I-19 PFO		1/1 ^d	78.5	0	0	0	1.3	1.3	1.3
Basin Total			78.7	0	0	0	1.4	1.4	1.4
Grand Total			148.7	7.7	0.2	5.4	23.3	13.9	21.5

NA= not available

SW = significant wetland

IW = important wetland

* 2/1^a = Ecology(2)/local ordinance rating (1)

^a Using City of Sea Tac Environmentally Sensitive Areas Ordinance (1994)

^b Using City of Des Moines Environmentally Sensitive Areas Ordinance (1997)

^c Using City of Federal Way Environmentally Sensitive Areas Ordinance Chapter 22.12 (2001)

^d Using City of Kent Wetlands Management Ordinance Chapter 11.04 (2000)

of water in adjacent wetlands. The type and magnitude of construction impacts would depend on final designs, including stormwater management systems, for each build alternative. Additional discussion of stormwater and water quality issues is included in Section 3.5, *Water Quality*.

Pollutants such as petroleum products, heavy metals, and sediments that are carried into wetlands by stormwater running off highways could negatively affect wetland functions. Plant stress, habitat degradation, and loss of flood storage capacity could result from the influx of such pollutants. Noise and visual disturbance from traffic on roads passing through and next to wetlands could disrupt breeding, nesting, and feeding of many types of wildlife.

Under each of the build alternatives, increases in roadway and other impervious surfaces could change hydrologic function in the wetlands and streams.

Alternative B

The total area of direct wetland impact from Alternative B, including the I-5 improvements, would be 7.7 acres, which would be the highest of all the build alternatives. This includes impacts on 6.0 acres of Category 2 wetlands, 1.6 acres of Category 3 wetlands, and 0.1 acre of Category 4 wetlands. Areas of PFO, PSS, and PEM habitat would be affected. No direct wetland impacts would occur in Category 1 wetlands. There would be a total of 23.3 acres of buffer impacts with Alternative B (Table 3.6-4), the highest of the build alternatives.

The SR 509 freeway extension and South Access Road portion of Alternative B would directly affect 7.7 acres of wetland and 21.6 acres of wetland buffer. Direct impacts would occur in Wetlands A, B, D, F, N, 1, 2, 6, 7, 8, 9, 16, 18, 21, and 22 (see Figures 3.6-1 and 3.6-4). No direct impacts would occur in Wetlands M, 5, 17, 15, 19, and 23, but portions of their buffers would be affected.

There would be no direct wetland impacts along the I-5 corridor. Approximately 1.6 acres of wetland buffer along Wetlands I-7, I-10, I-11, I-12, I-13, and I-19 could, however, be affected (Table 3.6-4).

Alternative C2 (Preliminary Preferred)

The total area of direct wetland impact from Alternative C2, including the I-5 improvements, would be approximately 0.2 acre. This includes impacts on 0.2 acre of Category 3 wetlands and 0.01 acre of Category 4 wetlands. Areas of PFO, PSS, and PEM habitat would be affected. Impacts on Wetlands A and B include 0.02 acre for bridge support footings. No direct wetland impacts would occur in Category 1 wetlands. There would be a total of 13.9 acres of buffer impacts associated with this alternative (see Table 3.6-4).

The direct wetland and buffer impacts would be the lowest of all the build alternatives.

The SR 509 freeway extension and South Access Road portion of Alternative C2 would directly affect 0.2 acre of wetland and 12.3 acres of wetland buffer. Direct impacts would occur in Wetlands A, B, M, N, 16, and 23 (Figures 3.6-2 and 3.6-4). Bridges would be constructed across Wetlands A, B, and D. Approximately 0.9 acre of Wetland A, 1.2 acres of Wetland B, and 0.6 acre of Wetland D would lie under the bridge decks and could be affected by shading. Direct impacts in these wetlands would be limited to potential placement of bridge support piers. No direct impacts would occur in Wetlands D, F, and G, but portions of their buffers would be affected.

Impacts along the I-5 corridor would be the same as for Alternative B (Table 3.6-4).

Alternative C3

The total area of direct wetland impact from Alternative C3, including the I-5 improvements, would be 5.4 acres, which would be higher than Alternative C2, but lower than Alternative B. This would include impacts on 4.2 acres of Category 2 wetlands, 0.3 acre of Category 3 wetlands, and 0.9 acre of Category 4 wetlands. Areas of PFO, PSS, and PEM habitat would be affected. No direct wetland impacts would occur in Category 1 wetlands. There would be a total of 21.5 acres of buffer impacts associated with this alternative (Table 3.6-4), which would be lower than Alternative B but higher than Alternative C2.

The SR 509 freeway extension and South Access Road portion of Alternative C3 would directly affect 5.4 acres of wetland and 19.9 acres of wetland buffer. Direct impacts would occur in Wetlands A, B, D, G, H, K, M, N, S, 16, 20, and 23 (Figures 3.6-3 and 3.6-4). A bridge would be constructed across Wetland A. Approximately 3.3 acres of the wetland would lie under the bridge deck and could be affected by shading. Direct impacts in Wetland A would be limited to potential placement of bridge support piers. No direct impacts would occur in Wetlands F, 15, and 17, but portions of their buffers would be affected.

Impacts along the I-5 corridor would be the same as for Alternative B (Table 3.6-4).

3.6.4 Mitigation Measures

Wetlands are recognized as an important and valuable natural resource, and their protection is a matter of public interest. The federal government and the State of Washington have a “no net loss” policy concerning wetlands. Environmental Sensitive Areas Ordinances of the City of SeaTac (1994), the

City of Des Moines (1997), the City of Federal Way City (2001), the City of Kent (2000), and King County (2001) were implemented to protect wetlands and mitigate unavoidable impacts. One goal of these policies is to achieve no overall loss of wetland acreage or function through mitigation of wetland impacts that results from regulated activities. Mitigation includes (in order of preference) avoidance, minimization, rectification, reduction, compensation, and monitoring.

As part of agency coordination for Alternative C2, the Preliminary Preferred Alternative, WSDOT has committed to avoiding all Category 1 wetlands and spanning all Category 2 wetlands with bridges to minimize impacts. In addition, the South Access Road would span the Tyee wetland/stormwater pond with a bridge to eliminate any direct impacts. If Alternative B or C3 is selected as the Preferred Alternative, similar design features to avoid and/or minimize wetland impacts would be evaluated.

Where direct impacts on wetlands cannot be avoided, compensation for impacts may be accomplished through wetland enhancement, restoration, or creation. Wetland impacts would be mitigated by the creation of new wetlands or enhancement of existing wetlands. Requirements include creation and/or restoration at minimum 1:1 mitigation ratio. Additional mitigation is required to satisfy Ecology's wetland mitigation guidelines. Shading impacts at bridge crossings could be mitigated by planting native shade-tolerant species.

An assessment of local and Ecology mitigation ratios indicates that Ecology's ratio requires more mitigation (Ecology 1998) than is required by the ordinances of SeaTac (1994), Des Moines (1997), Federal Way (2001), Kent (2000), or King County (2001). Table 3.6-5 shows preliminary estimates for areas of wetland mitigation required using mitigation ratios from Ecology (1998). A wetland mitigation plan is being prepared that will provide a detailed description of wetland mitigation for the proposed project.

In addition, any wetland enhancement, restoration, or creation projects would need to adhere to guidance presented in the FAA advisory circular (FAA 1997) regarding wildlife attractions on or near airports. This circular discourages the placement of wetland mitigation projects that could attract certain wildlife in areas where air traffic is present. This would likely require that certain wetland functions restricted by the FAA be mitigated at one or more mitigation sites outside the FAA 10,000-foot restricted zone.

3.6.5 Construction Activity Impacts and Mitigation

Potential temporary impacts resulting from construction of any of the build alternatives include clearing, grading, excavation, and filling. Types of construction include temporary access roads along vertical wall structures or bridge piers during construction. These activities would expose erodible soils,

Table 3.6-5 Preliminary Mitigation Requirements for Wetland Impacts Based on Ecology (1998)															
Wetland and Watershed	USFWS Classification	Ecology Rating	Mitigation Ratio	Recommended Mitigation by Vegetation Community Type (acres)											
				Alternative B			Alternative C2 (Preliminary Preferred)				Alternative C3				
				Total	PFO	PSS	PEM	Total	PFO	PSS	PEM	Total	PFO	PSS	PEM
Des Moines Creek Basin															
A	PFO/PSS	2	3:1	0.1	0.1			0.03	0.03			0.03	0.03		
B	PFO/PSS/PEM	2	3:1	8.7	8.7			0.03	0.03			8.0	8.0		
D	PFO/PSS/PEM	2	2:1	3.1		3.1						3.0		3.0	
F	PFO/PSS/PEM/ POW	2	3:1	4.4	4.4										
G	PSS/PEM	2	2:1									0.2		0.2	
H	POW/PEM	4	1.25:1									0.1			0.1
K	PEM	3	2:1									0.02			0.02
M	PSS	3	2:1					0.06		0.06		0.2		0.2	
N	PSS	3	2:1	0.2		0.2		0.2		0.2		0.2		0.2	
S	PEM	4	1.25:1									0.7			0.7
1	PFO	3	3:1	0.07	0.07										
2	PFO	3	3:1	2.2	2.2										
5	PFO/PSS	3	3:1												
6	PFO/PSS	3	3:1	0.04	0.04										
7	PFO/PSS	3	3:1	1.5	1.5										
8	PFO/PSS	3	3:1	0.2	0.2										
9	PSS, Stream	2	2:1	0.08		0.08									
15	PFO	3	3:1												
16	PFO	3	3:1	0.1	0.1			0.1	0.1			0.1	0.1		
17	PFO	3	1.25:1												
18	PEM	4	1.25:1	0.1			0.1								
19	PFO/PSS	3	3:1	0.01	0.01										
20	PSS	4	1.25:1									0.3		0.3	
21	PEM	3	2:1	0.4			0.4								
22	Ditch	4	1.25:1	0.01			0.01								
23	PEM	4	1.25:1					0.01			0.01	0.01			0.01
Basin Total				21.1	17.2	3.4	0.5	0.5	0.2	0.3	0.01	12.9	8.1	4.0	0.8
Mill Creek Watershed															
I5-7	PEM	3	2:1	0	0	0	0	0	0	0	0	0	0	0	0
Lower Green River Watershed															
I-10	PEM/PSS	3	2:1												
I-11	PFO/PSS	3	3:1												
I-12	PEM/PSS	3	2:1												
Basin Total				0	0	0	0	0	0	0	0	0	0	0	0
Lower Puget Sound Watershed															
I-13	PFO	3	3:1												
I-19	PFO	1	6:1												
Basin Total				0	0	0	0	0	0	0	0	0	0	0	0
Grand Total				21.1	17.2	3.4	0.5	0.5	0.2	0.3	0.0	22.7	18.3	4.0	1.1

Ecology (1998) = How Ecology Regulates Wetlands. Publication No. 97-112.

Minimum mitigation ratio for creation or restoration:

Category 1 = 6:1

Category 2 or 3--PFO = 3:1

Category 2 or 3--PSS or PEM = 2:1

Category 4 = 1.25:1

increasing the potential for erosion and sediment transport to wetlands. Sedimentation could degrade water quality by increasing turbidity, suspended solids, and pollutants. Sediment deposition in wetlands could reduce floodwater storage capacity, change water depth and flow patterns, and block water inflow or outflow paths. Large volumes of sediment could kill trees by cutting off oxygen to their roots and could bury the eggs of aquatic organisms.

Wetland water quality could be adversely affected during construction as a result of onsite storage and use of fuel and lubricants for construction equipment. Pollutants from an accidental spill could be carried to adjacent wetlands by surface water runoff, degrading both water quality and wildlife habitat.

Adherence to BMPs and local environmental protection policies would ensure that stormwater runoff is collected and treated and that discharge to existing water bodies is controlled. A Stormwater Pollution Prevention Plan and TESC Plan would be prepared and implemented to avoid or minimize construction impacts on wetlands and streams. Settling ponds, containment berms, silt fences, sediment traps, seeding of exposed slopes, and other measures would be implemented as appropriate. Areas of short-term construction impacts would be restored by replanting with native trees and shrubs upon completion of construction activities.

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